#13-SYNCO

ENVIRONMENTAL PROTECTION AGENCY

[FRL - 2130-5]

13

Grant of Application for a Fuel Waiver; Summary of Decision

AGENCY: Environmental Protection Agency (EPA)

ACTION: Notice

SUMMARY: Pursuant to section 211(f) of the Clean Air Act (Act), the Administrator of EPA is conditionally granting a fuel waiver request, involving ethanol and a proprietary stabilizer, submitted by the Synco 76 Fuel Corporation.

PUBLIC DOCKET: Copies of all public information on this waiver application and the Administrator's decision are available for inspection in, or by request from, public docket EN-81-20 at the Central Docket Section (A-130) of the Environmental Protection Agency, Gallery I-West Tower, 401 M Street, S.W., Washington, DC 20460, (202) 755-0245, between the hours of 8:00 a.m. and 4:00 p.m. As provided in 40 CFR Part 2, a reasonable fee may be charged for copying services.

FOR FURTHER INFORMATION CONTACT: James W. Caldwell, Robert Gelman, or Winston Burt, Fuels Section, Field Operations and Support Division (EN-397), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460, (202) 382-2635.

SUPPLEMENTARY INFORMATION: Section 211(f) of the Clean Air Act (Act), 42 U.S.C. 7545(f)(1), prohibits the introduction into commerce of certain new automotive fuels and fuel additives. Section 211(f)(4) of the Act, 42 U.S.C. 7545, provides that the Administrator of EPA, upon application by a fuel or fuel additive manufacturer, may waive the prohibitions established under section 211(f) if the Admini[illegible]

(3) The Deteriorated Emissions Test

For each vehicle, the effect the waiver fuel or fuel additive had on emissions is determined. This incremental effect, either positive or negative, is added to the 50,000-mile certification emission value of the certification emission vehicle which the test vehicle represented. This incremented 50,000-mile emission value is compared to emissions standards to determine if it did or did not exceed the standards. Either a pass or fail is assigned accordingly. The pass/fail results are analyzed using a one-side sign test.

The first two methods of analysis are designed to determine whether the waiver fuel or fuel additive has an adverse effect on emissions as compared to the base fuel. Each characterizes a different aspect of adverse effect. The Paired Difference Test detemines the mean difference in emissions between the base fuel and the waiver fuel or fuel additive. The Sign of Difference Test assesses the number of vehicles indicating an increase or decrease in emissions. The two tests are considered together in evaluating whether an adverse effect exists to assure that a mean difference determination is not unduly influenced by very high or very low emission results from only a few vehicles.

The Deteriorated Emissions Test analysis predicts whether the waiver fuel or fuel additive is likely to cause a vehicle to fail to meet emission standards. This test examines each vehicle's emission performance as compared to each pollutant standard. It is useful to perform this analysis even if the first two analyses indicate

the waiver fuel or fuel additive has no adverse effect. The analysis predicts whether the emissions from any particular type of vehicles or special emission control technologies are uniquely sensitive to the waiver fuel or fuel additive, thus causing vehicles to fail to meet emission standards. This effect could be masked in the previous analyses which consider the emissions results as a group without distinguishing the emissions impact on subgroups.

APPENDIX A

STATISTICAL CRITERIA

The following is a brief description of the statistical tests used to characterize the emission effects of a fuel or fuel additive:

(1) The Paired Difference Test

For each vehicle tested on a base fuel and on the waiver fuel or fuel additive, the difference between the waiver fuel or fuel additive emissions and the base fuel emissions is calculated. A 90% confidence interval is constructed for the mean differences. If the resulting interval lies entirely below zero it is indicative of no adverse effect from this waiver fuel or fuel additive. If the entire interval is above zero, it is indicative of an adverse effect from the waiver fuel or fuel additive. If the interval contains zero, there is arguably no difference between the base fuel and the waiver fuel or fuel additive with regard to emissions, provided the confidence interval is small.

(2) The Sign of Difference Test

For each vehicle tested with a base fuel and the waiver fuel or fuel additive, the sign of the emission difference between the waiver fuel or fuel additive emission and the base fuel emission is ascertained. This test is designed to determine whether the number of vehicles demonstrating an increase (+) in emissions with the waiver fuel or fuel additive significantly (at a 90 percent confidence level) exceeded those showing a decrease (-) in emissions with the waiver fuel or fuel additive.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

Grant of Application for a Fuel Waiver Submitted by the Synco 76 Fuel Corporation (Synco)--Decision of the Administrator

I. Introduction

Section 211(f)(1) of the Clean Air Act (Act), 42 U.S.C 7545(f)(1), states that, effective upon March 31, 1977, it shall be unlawful for any manufacturer of any fuel or fuel additive to first introduce into commerce, or to increase the concentration in use of, any fuel or fuel additive for general use in light duty motor vehicles manufactured after model year 1974 which is not substantially similar [1] to any fuel or fuel additive utilized in the certification of any model year 1975, or subsequent model year, vehicle or engine under section 206 of the Act. [2] Section 211(f)(4) of the Act, 42 U.S.C. 7545(f)(4), provides that the Administrator of the EPA, upon application of any manufacturer of any fuel or fuel additive, may waive the prohibitions established under section 211(f)(1), [3] if the Administrator determines that the applicant has established that such fuel or fuel additive or a specified concentration thereof, will not cause or contribute to a failure of any emission control device or system (over the useful life of any vehicle in which

---

[1] The revised definition of "substantially similar" was published in the Federal Register on July 28, 1981, 46 Fed. Reg. 38582.

[2] Section 206 of the Act sets forth the certification requirement with which vehicle manufacturers must comply in order to introduce into commerce new model year motor vehicles.

[3] The Administrator may also waive the prohibitions or limitations contained in sections 211(f)(2) and (3).

such device or system is used) to achieve compliance by the vehicle with the emission standards with respect to which it has been certified pursuant to section 206 of the Act. If the Administrator does not act to grant or deny an application within 180 days of receipt of the application, the waiver authorized by section 211(f)(4) shall be treated as granted.

On November 20, 1981, Synco 76 Fuel Corporation (Synco) submitted an application for a waiver for a fuel additive. A Federal Register notice was published January 13, 1982, 47 Fed. Reg. 1407, acknowledging receipt of the application and soliciting comments. The 180 day review period provided by section 211(f)(4) is scheduled to expire on May 18, 1982.

Synco stated in its application that the fuel additive is composed of a proprietary stabilizer mixed with anhydrous ethanol and denatured by Methyl Isobutyl Ketone (MIK). The proprietary stabilizer is composed of 67% hexanol, 4% pentanol, 2% octanol, and 27% (+/- 2%) araffinates derived from the coal liquefaction process. The precise mixture of the araffinates cannot be divulged since the applicant submitted it under a claim of business confidentiality as provided in 40 C.F.R. Part 2. The fuel additive will be mixed in a ratio of one-fourth (1/4) gallon stabilizer to five (5) gallons of ethanol, which will be used with forty-five (45) gallons of finished unleaded gasoline to produce a final fuel (waiver fuel).

In making a determination on an application, EPA endeavors to gather as much information

of the fuel or fuel additive be made public allowing other interested parties the opportunity to test and comment on the emissions impact of the fuel or fuel additive. When the applicant has a legitimate business confidentiality claim, EPA will honor such claim, but EPA insists that the applicant make the fuel or fuel additive available for testing by interested parties subject to appropriate confidentiality agreements.

Synco asserted a claim of business confidentiality with regard to the precise mixture of the araffinates. The procedures for maintaining confidentiality and providing sample test fuel outlined above were followed. No one requested a sample of the pre-mixed fuel additive (ethanol plus stabilizer) for test purposes.

Synco supplied emissions and materials compatibility test data with its waiver application. Synco concluded that the data provided would demonstrate that the fuel additive would not cause or contribute to a failure of any emission control device or system (over the useful life of any vehicle in which such device or system is used) to achieve compliance by the vehicle with the emission standards with respect to which it has been certified pursuant to section 206 of the Act.

II. Summary of the Decision

I have determined that Synco has met the burden established under section 211(f)(4) necessary to obtain a waiver for the fuel additive, provided the proprietary stabilizer is composed of

67% hexanol, 4% pentanol, 2% octanol, and 27% (+/- 2%) araffinates derived from the coal liquefaction process; the fuel additive, mixed in a ratio of one-fourth (1/4) gallon stabilizer to five (5) gallons ethanol, will be added to forty-five (45) gallons of finished unleaded gasoline; the final fuel (i.e., stabilizer plus anhydrous ethanol, denatured by MIK, plus finished unleaded gasoline) meets the American Society for Testing and Materials (ASTM) fuel volatility specifications (ASTM D 439-81) for the area and time of year in which it is marketed; and Synco, and any other manufacturer of the fuel additive, will inform all customers to whom the fuel additive is sold of the conditions of this waiver and provide guidance as to how those conditions will be met. In reaching this decision, I have considered all the available information and data, including that provided by persons other than the applicant.

III. Method of Review

In order to obtain a waiver for a fuel or fuel additive (hereafter collectively referred to as "fuel"), the applicant must establish that the fuel and its emission products will not cause or contribute to a failure of any emission control device or system (over the useful life of any vehicle in which such device or system is used) to achieve compliance by the vehicle with the emission standards with respect to which it has been certified pursuant to section 206 of the Act. This burden, which Congress has imposed on the applicant, if interpreted literally, is virtually impossible to meet, as it requires the proof of a negative proposition, i.e., that no vehicle will fail to meet

Taken literally, it would require the testing of every vehicle. Recognizing that Congress contemplated a workable waiver provision, mitigation of this stringent burden was deemed necessary. For purposes of the waiver provision, EPA has previously indicated that reliable statistical sampling and fleet testing protocols may be used as a basis for a waiver decision (see, Waiver Decision on Tertiary Butyl Alcohol (TBA), 44 Fed. Reg. 10530 (February 21, 1979)). Recognizing the inherent limitations of using statistical methods to predict real-world situations, it may be necessary to exercise some judgment in interpreting borderline test results. Therefore, I have concluded that the appropriate criterion for granting a waiver under section 211(f)(4) is whether the results of testing under the statistical procedure indicate that use of the fuel or fuel additive will cause no significant failures of vehicles in a national fleet to meet emission standards.

Emission data submitted with respect to a waiver request are analyzed by appropriate statistical methods in order to characterize the effect that a fuel will have on emissions. Which tests are appropriate to characterize the emission effects of a fuel depend on whether the fuel is predicted to have an instantaneous effect or a long-term deteriorative effect on emissions or both. If the fuel is predicted to have only an instantaneous effect, i.e., the fuel causes an instantaneous incremental shift in the emission levels relative to a base fuel and that shift remains constant throughout the useful life of the vehicle, then "back-to-back" emissions testing

will suffice.[4/] If, however, a long-term deteriorative effect is predicted, then 50,000-mile durability testing would be required.[5/]

The statistical tests applied to emissions data provided with respect to a waiver request for a fuel expected to have an instantaneous emission effect are: a Paired Difference Test, a Sign of Difference Test, and a Deteriorated Emissions Test (a test which compares the deteriorated emissions with the emission standards in lieu of actually having 50,000-mile emissions data). These statistical tests are described in Appendix A to this decision.

An alternative to providing the amount of data necessary to meet the statistical requirements is to make judgments based upon a reasonable theory regarding emission effects supported by confirmatory testing. If there exists a reasonable theory which predicts the emission effects of a fuel, an applicant may only need to conduct a sufficient amount of testing to demonstrate the validity of such theory. This theory and confirmatory testing then form the basis from which the Administrator may exercise his judgment on whether the additive will cause or contribute to a significant failure of any emission control device or system which results in a failure by the vehicle to achieve compliance with emission

---

[4/] Back-to back emission testing involves testing a vehicle on a base fuel, then testing that same vehicle on the waiver fuel. The difference in emission levels is attributed to the waiver fuel.

[5/] 50,000-mile durability testing involves operating a matched set of vehicles for 50,000 miles and

standards. In addition to emission data, EPA also reviews data on materials compatibility, fuel composition, and specifications. This information is necessary to characterize a fuel fully, and to determine whether such additive will cause or contribute to a significant failure of vehicles to comply with appropriate emissior standards.

Such failure could result from any of the above factors. For example, materials compatibility problems could lead to the failure of fuel systems which are designed to precise tolerances. Deviations beyond the tolerances could result in greater emissions. Volatility specifications could demonstrate a tendency for high evaporative losses.

Analysis

A. Exhaust Emissions Data

Experience with gasohol has led EPA to believe that only an instantaneous emissions effect should be observed with this fuel additive. [6/] Thus, the emission data were analyzed presuming that the final fuel with this additive would exhibit only instantaneous emission effects.

Exhaust emission data were available on eight vehicles tested on the waiver fuel and a base unleaded gasoline. [7/] Numerical results of the statistical tests are summarized in Appendix B. The Paired Difference Test (Test 1) and the Sign of Difference

---

6/ See Waiver Decisions for TBA, 44 Fed. Reg. 10530 (February 21, 1979); MTBE, 44 Fed. Reg. 12242 (March 6, 1979).

Test (Test 2) are used to test the directional effect and the magnitude of the effect which the waiver fuel has on emissions and to determine if it is likely to contribute to a failure of vehicles to meet emission standards. The Deteriorated Emissions Test (Test 3) is used in lieu of 50,000-mile durability test results to determine if the new fuel or additive is likely to cause a failure of vehicles to meet emission standards over their useful life.

The results from the Paired Difference Test (Test 1) and the Sign of Difference Test (Test 2) indicate that exhaust hydrocarbons (HC) do not increase, carbon monoxide (CO) emissions decrease, and oxides of nitrogen (NOx) likely increase, although the amount of the increase is modest. The Deteriorated Emissions Test (Test 3) indicates that there would not be any significant failure of vehicles to meet HC, CO, or NOx standards. 8/

B. Evaporative Emissions

Synco asserted that the evaporative emissions would be less than those for gasoline at fuel system temperatures below 120° F. However, fuel system temperatures are generally higher than this, and some increased evaporative emissions have been noted

---

8/ The statistical Deteriorated Emissions Test is designed to provide a 90 percent probability of failure of the Test if 25 percent or more of the vehicle fleet are likely to fail to meet emission standards using the applicant's fuel or fuel additive. For an eight vehicle sample, this criterion dictates that one vehicle failure or more constitutes a failure. In this case, the Synco fuel fails for NOx by just one vehicle. Because the failure was borderline, i.e., small changes to the test criteria would result in a pass, coupled with the small increase in NOx emissions found in Test 1, this problem is not significant enough to warrant a disapproval of the waiver request.

in the test data. The evaporative emission behavior of the Synco additive is indeed similar to that of gasohol and may in fact increase evaporative emissions to a lesser degree than gasohol. EPA experience has shown that evaporative emissions are directly related to fuel volatility characteristics, primarily the Front End Volatility Index (FEVI). [9/] This relationship has been clearly established when the fuel is composed entirely of hydrocarbon components. It has also been demonstrated to apply when the fuel contains some relatively small percentage of oxygenated hydrocarbons such as methanol and tertiary butyl alcohol (TBA). Since the total alcohol percentage is similar to a previously granted waiver involving methanol and TBA [10/], I would expect this relationship to hold for the Synco fuel. Thus controlling the volatility of the finished fuel within ASTM volatility specifications should adequately control evaporative emissions, and they should be no worse than those of commercially available fuels.

It would be discriminatory to require the applicant's fuel to meet a more stringent volatility limit in order to control evaporative emissions than is characteristic of commercially available fuels.[11/] The volatility of commercially available

---

[9/] FEVI is equal to the Reid Vapor Pressure (partial pressure at 158° F, ASTM D439-78) plus 0.13 times the numerical percentage of fuel evaporated at 158°F.

[10/] See Summary of Decision, 4.75% methanol/4.75% TBA, 46 Fed. Reg. 56361 (November 16, 1981).

[11/] See Waiver Decision for Oxinol, 44 Fed. Reg. 37074 (June 25, 1979).

gasoline varies over a substantial range, and, indeed, must be blended with the correct volatility for the particular geographic area and time of year. Therefore, I conclude that the waiver fuel will not cause or contribute to the failure of vehicles to meet evaporative emission standards provided it meets the ASTM volatility specifications (ASTM D 439-81)[12/] appropriate for the area and the time of year as provided in this waiver.

C. Other Technical Issues -- Materials Compatibility

Materials compatibility is an important factor when reviewing a waiver request. Materials incompatibility can contribute to or cause the failure of vehicles to meet either their exhaust or evaporative emission standards. This can occur because a fuel or additive may cause changes in components in carburetors or fuel systems which then exceed the tolerances specified by the manufacturers. Such changes can impair the performance of vehicles to the point that emissions are adversely affected. Unfortunately, materials compatibility data are not as easily subjected to quantitative analysis as are emission data.

Synco performed materials compatibility testing with a 1980 Buick Regal automobile. Each automotive engine fuel system part directly associated with exposure to unburned fuels was removed from the Buick, disassembled and inspected. The parts, including the fuel tank, were then immersed in a laboratory container containing

---

12/ Available for inspection in Public Docket EN-81-20 or from the American Society for Testing and Materials, 1916 Race Street, Phil-

the waiver fuel for a total of 49 days. Each seven days and at the end of the 49 day period the metal parts were inspected for signs o corrosion. Also, the elastomers, rubber and other non-metal parts were inspected for softening, swelling, or other effects.

In addition to the fuel system parts of the Buick, strips of brass, zinc alloy, terne alloy, steel, copper, bronze, and aluminum alloy were immersed in the waiver fuel for the same 49 day period. These materials also were inspected each seven days and at the end of the total period.

Synco reported that the above-described test produced the following results: no blistering, swelling, corrosion or other metallic effects, delamination, softening or signs of deterioration were observed in either the fuel system components of the Buick or the additional special materials; microscopic review of all the materials showed no real or other observable effects beyond normal wear.

Based on the information submitted by Synco and EPA's technical judgment, I conclude that the waiver fuel does not present a materials compatibility problem affecting emissions with the fuel systems currently in use.

IV. Findings and Conclusion

I have determined that Synco has established that the fuel additive will not cause or contribute to a significant failure of emission control devices or systems (over the useful life of any vehicle in

which such devices or systems are used) to achieve compliance by th vehicle with applicable emission standards under the Act.

I hereby grant the waiver requested by Synco for its fuel additive, provided the following conditions are met:

1. The proprietary stabilizer is composed of 67% hexanol, 4% pentanol, 2% octanol, and 27% (+/-2%) araffinates derived from the coal liquefaction process;

2. The fuel additive, mixed in a ratio of one-fourth (1/4) gallon stabilizer to five (5) gallons anhydrous ethanol denatured by Methyl Isobutyl Ketone (MIK), will be added to forty-five (45) gallons of finished unleaded gasoline;

3. The final fuel (i.e., stabilizer plus anhydrous ethanol, denatured by MIK, plus finished unleaded gasoline) meets the American Society for Testing and Materials (ASTM) fuel volatility specifications (ASTM D 439-81) for the area and time of year in which it is marketed; and

4. Synco, and any other manufacturer of the fuel additive, inform all customers to whom the fuel additive is sold of the conditions of this waiver and provide guidance as to how those conditions, particularly with respect to volatility, will be met.

MAY 18 1982
Date

Anne M. Gorsuch
Anne M. Gorsuch
Administrator

APPENDIX B

Numerical Results of the Data

The results of the statistical tests described above are summarized here:

1) The Paired Difference Test

The 90 percent confidence intervals around the mean difference between the base fuel and the Synco Fuel for each pollutant are:

Hydrocarbon	(HC)	-0.04 to +0.02 grams per mile
Carbon Monoxide	(CO)	-1.73 to -0.17 grams per mile
Oxides of Nitrogen	(NOx)	+0.07 to +0.30 grams per mile

2) Sign of Difference Test

We list the confidence that the Synco Fuel will cause an increase in emissions over the base fuel based on the observed increases out of the total vehicles tested:

HC	3 out of 8	15% confidence of increase
CO	2 out of 8	4% confidence of increase
NOx	7 out of 8	97% confidence of increase

3) Deteriorated Emissions Test

The number of vehicles whose incremented 50,000-mile emission values exceed applicable standards is:

HC	0 out of 8
CO	0 out of 8
NOx	1 out of 8

The statistical Deteriorated Emissions Test is designed to provide a 90 percent probability of failure of the Test if 25 percent or more of the vehicle fleet are likely to fail to meet emission standards using the applicant's fuel or fuel additive. For an eight vehicle sample, this criterion dictates that one vehicle failure or more constitutes a failure. In this case, the Synco fuel fails for NOx by just one vehicle. Because the failure was borderline, i.e., small changes to the test criteria would result in a pass, coupled with the small increase in NOx emissions found in Test 1, this problem is not significant enough to warrant a disapproval of the waiver request.

applicant has established that such fuel or fuel additive will not cause vehicles to fail emissions standards. The Synco 76 Fuel Corporation (Synco) has submitted such an application for a fuel additive.

For reasons specified in the decision document, I have decided conditionally to grant the waiver request by Synco for a fuel additive composed of a proprietary stabilizer mixed with anhydrous ethanol and denatured by Methyl Isobutyl Ketone (MIK), provided that the proprietary stabilizer is composed of 67% hexanol, 4% pentanol, 2% octanol, and 27% (+/- 2%) araffinates derived from the coal liquefaction process (the precise mixture of the araffinates is proprietary information); the fuel additive, mixed in a ratio of one-fourth (1/4) gallon stabilizer to five (5) gallons ethanol, will be added to forty-five (45) gallons of finished unleaded gasoline; the final fuel (i.e., stabilizer plus anhydrous ethanol, denatured by MIK, plus finished unleaded gasoline) meets the American Society for Testing and Materials (ASTM) fuel volatility specifications (ASTM D 439-81) for the area and time of year in which it is marketed; and Synco, and any other manufacturer of the fuel additive, will inform all customers to whom the fuel additive is sold of the conditions of this waiver and provide guidance as to how those conditions will be met.

The waiver is being granted, as explained in the decision document, based on the determination that the additive, when used

as specified above, will not cause or contribute to a significant failure of 1975 or subsequent model year vehicles or engines to comply with applicable emission standards under the Act.

This action is not a "rule" as defined in the Regulatory Flexibility Act, 5 U.S.C. 601(2), because EPA is not required to undergo "notice and comment" under section 553(b) of the Administrative Procedure Act, or other law. Therefore, EPA has not prepared a supporting regulatory flexibility analysis addressing the impact of this action on small business entities.

This is a final Agency action of national applicability. Under section 307(b)(1) of the Clean Air Act, judicial review of this action is available only by the filing of a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit within 60 days of (the date of publication). Under section 307(b)(2), today's action may not be challenged later in a civil or criminal proceeding for enforcement.

MAY 18 1982
Date

Anne M. Gorsuch

Anne M. Gorsuch
Administrator